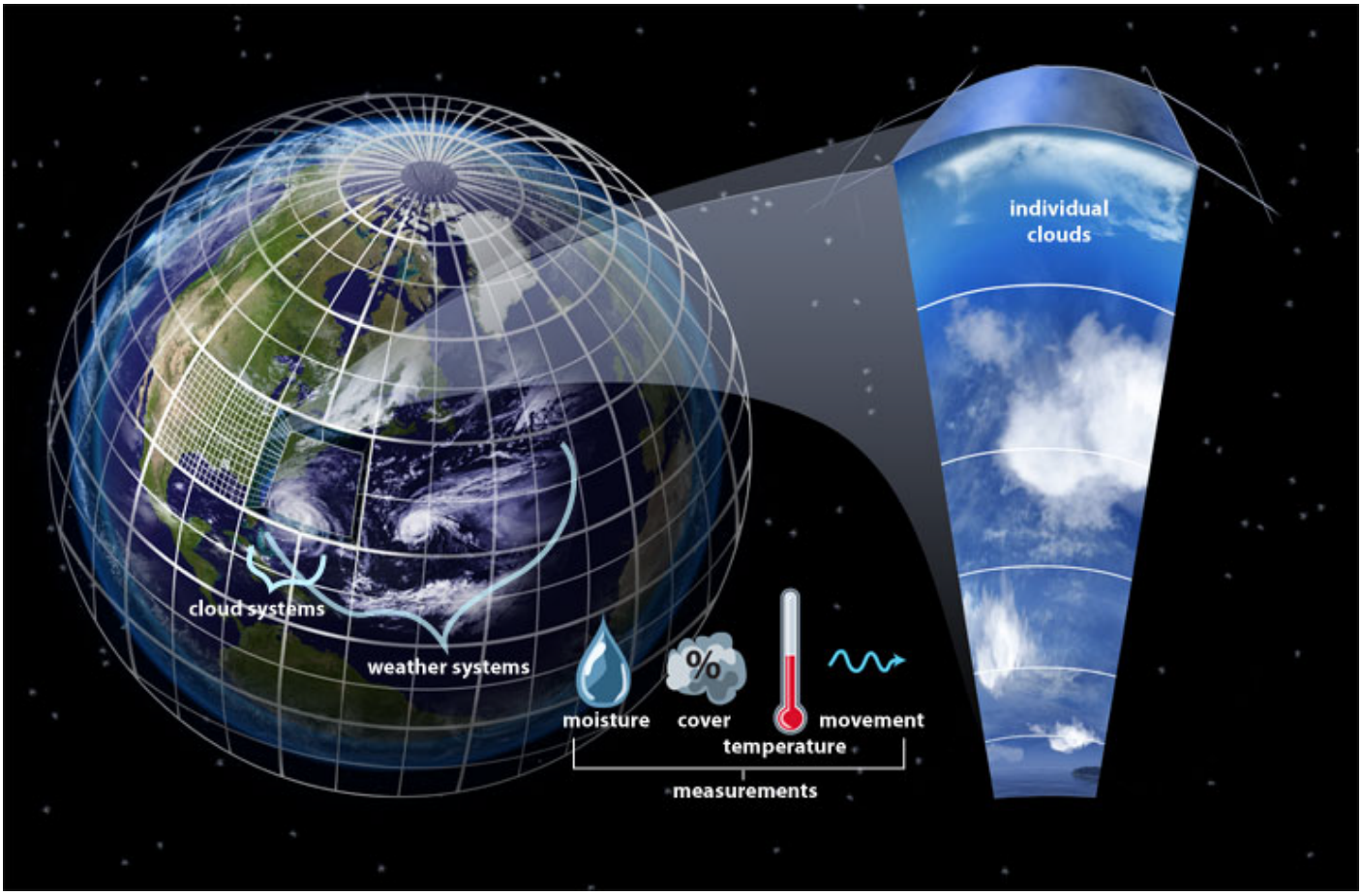
CLOUDS
THE WILD CARD OF CLIMATE CHANGE



The main tools used by climate scientists to predict future climate change are computer models. These models work by integrating data on various atmospheric variables, such as atmospheric levels of greenhouse gases, cloud conditions and many other variables, for a particular time period. Then, based on computed interactions between these variables, the models predict the resulting climate for the represented time period.

Because it is impossible to represent all atmospheric conditions over every inch of the planet, most climate models present a simplified version of the Earth; they represent the Earth by dividing it into grid boxes or "grid cells-usually each about the size of the state of Delaware. Each of these cells is represented as a single, unbroken uniform area. This means that conditions across each cell--including cloud conditions--are only approximated, generalized or averaged; sub-regions within cells that deviate from such cell-wide approximations, generalizations or averages are not directly represented.

So even though a Delaware-sized cell would be big enough to hold thousands of clouds, a climate model would not represent each of these clouds. Instead, it would treat the entire cell as a single "box" with an "average" cloudiness (a fraction between 0 and 1) representing how much of its total area is covered by clouds. The cell's other cloud characteristics would also be represented statistically in terms of their cell-wide averages.

Image Credit: Nicolle Rager Fuller, National Science Foundation
Writing and Content: Lily Whiteman, National Science Foundation
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